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(71)出願人 595147700

株式会社エイ・ティ・アール知能映像通信
研究所

京都府相楽郡精華町大字乾谷小字三平谷5
番地

(72)発明者 西本 一志

京都府相楽郡精華町大字乾谷小字三平谷5
番地 株式会社エイ・ティ・アール知能映
像通信研究所内

(72)発明者 角 康之

京都府相楽郡精華町大字乾谷小字三平谷5
番地 株式会社エイ・ティ・アール知能映
像通信研究所内

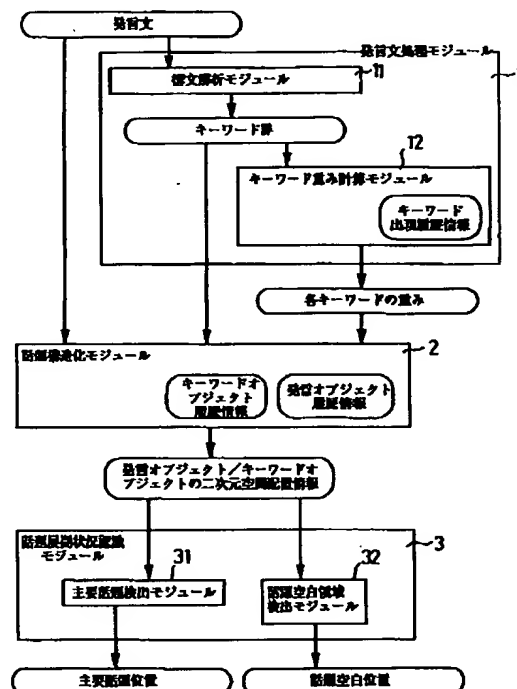
(74)代理人 弁理士 深見 久郎 (外2名)

(54)【発明の名称】 話題処理装置

(57)【要約】

【課題】 参加している対話を常に活性化し、これによ
って対話の創造性をより強力なものとする話題処理装置
を提供する。

【解決手段】 発言文処理モジュール1によって各参加
者の発言オブジェクトを形態素解析してキーワードを抽
出し、話題構造化モジュール2によってキーワードと発
言オブジェクトとの関連性を2次元空間上に順次配置し
て対話の内容を構造化し、話題展開状況認識モジュール
3によって対話の内容および発言の推移情報から話題の
展開状況を把握し、話題提供モジュール起動モジュール
4によって話題転換が検出されたことに応じて、話題提
供モジュール5が話題の種となる情報を抽出して提供す
る。



【特許請求の範囲】

【請求項1】 複数の話者による対話を活性化するための話題処理装置であって、

各参加者の個々の発言を発言オブジェクトとして形態素解析を行ない、その結果から所定の種類の単語のみをキーワードとして抽出するキーワード抽出手段、前記キーワード抽出手段によって抽出された各キーワードの出現頻度ならびに出現間隔に基づき、各発言オブジェクトについてそれに含まれた各キーワードの重みを評価するキーワード重み計算手段、

前記キーワード抽出手段ならびに前記キーワード重み計算手段によって得られたキーワードおよびそれらの重みに基づき、ある時点までのすべての発言オブジェクト相互の関連性を含む各発言オブジェクトが含むキーワード群の共有関係を用いて計算し、一方ですべてのキーワード相互の関連性をそれらのキーワードの各発言オブジェクトにおける共起関係を用いて計算し、その結果発言オブジェクト相互ならびにキーワード相互の関係を空間的構造として表現することにより対話内容を構造化する対話構造化手段、および前記対話構造化手段によって得られた対話内容構造から特に発言オブジェクトが密集している部分の空間位置情報を求めることによって、その時点までの対話における主要話題を検出する主要話題検出手段を備えた、話題処理装置。

【請求項2】 複数の話者による対話を活性化するための話題処理装置であって、

各参加者の個々の発言を発言オブジェクトとして形態素解析を行ない、その結果から所定の種類の単語のみをキーワードとして抽出するキーワード抽出手段、

前記キーワード抽出手段によって抽出された各キーワードの出現頻度ならびに出現間隔に基づき、各発言オブジェクトについてそれに含まれた各キーワードの重みを評価するキーワード重み計算手段、

前記キーワード抽出手段ならびに前記キーワード重み計算手段によって得られたキーワードおよびそれらの重みに基づき、ある時点までのすべての発言オブジェクト相互の関連性を各発言オブジェクトが含むキーワード群の共有関係を用いて計算し、一方ですべてのキーワード相互の関連性をそれらのキーワードの各発言オブジェクトにおける共起関係を用いて計算し、その結果発言オブジェクト相互ならびにキーワード相互の関係を空間的構造として表現することにより対話内容を構造化する対話構造化手段、および前記対話構造化手段によって得られた対話内容構造から発言オブジェクトが存在しない空白領域の位置情報を求めることによって、その時点までの対話における話題の空白領域を検出する話題空白領域検出手段を備えた、話題処理装置。

【請求項3】 さらに、前記対話構造化手段によって得られた対話内容構造から特に発言オブジェクトが密集している部分の空間位置情報を求めることによって、その

時点までの対話における主要話題を検出する主要話題検出手段を備えた、請求項2の話題処理装置。

【請求項4】 さらに、前記主要話題検出手段によって把握された主要話題の空間位置近傍に位置するキーワードを所定数集め、これらのキーワードの重みを主要話題の空間位置からの距離に応じて評価する主要話題関連キーワード抽出手段、

前記主要話題関連キーワード抽出手段によって得られたキーワード群に基づき、連想辞書を用いて連想キーワード群を想起する連想起手段、および前記連想起手段によって想起された連想キーワード群を用いてデータベースから関連情報を検索抽出する主要話題関連情報抽出手段を備えた、請求項1または請求項3の話題処理装置。

【請求項5】 さらに、前記話題空白領域検出手段によって把握された話題空白領域の近傍に位置するキーワードを所定数集め、これらのキーワードの重みを話題空白領域からの距離に応じて評価する空白領域周辺キーワード抽出手段、および前記空白領域周辺キーワード抽出手段によって得られたキーワード群を用いてデータベースから関連情報を検索抽出する空白領域関連情報抽出手段を備えた、請求項2または請求項3の話題処理装置。

【請求項6】 さらに、前記主要話題検出手段によって把握された主要話題の空間位置近傍に位置するキーワードを所定数集め、これらのキーワードの重みを主要話題の空間位置からの距離に応じて評価する主要話題関連キーワード抽出手段、

前記主要話題関連キーワード抽出手段によって得られたキーワード群に基づき、連想辞書を用いて連想キーワード群を想起する連想起手段、

前記連想起手段によって想起された連想キーワード群を用いてデータベースから関連情報を検索抽出する主要話題関連情報抽出手段、

前記話題空白領域検出手段によって把握された話題空白領域の近傍に位置するキーワードを所定数集め、これらのキーワードの重みを話題空白領域からの距離に応じて評価する空白領域周辺キーワード抽出手段、および前記空白領域周辺キーワード抽出手段によって得られたキーワード群を用いてデータベースから関連情報を検索抽出する空白領域関連情報抽出手段を備えた、請求項3の話題処理装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は話題処理装置に関し、特に、複数の参加者による対話を活性化するための話題処理装置に関する。

【0002】

【従来の技術】対話は、新たな発想を得るために非常に有効な創造的行為と見なすことができる。学会やシンポジウムなどにおいて、その企画者や司会者がしばしば

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「活発な議論を期待します」と言うのは、1つには議論にそのような効果があることを前提としているからである。また、研究者のラウンジで研究者が交わすとりとめもない対話の中から新たな情報が得られること、そして新しい発想や問題解決のヒントが得られることはしばしば経験することである。

【0003】人の発想の過程には2つの重要な過程があるといわれる。1つは発散的思考過程であり、もう1つは収束的思考過程である。解の不明なある問題に対して、人はまず発散的思考過程においてその問題と明らかに関連ある情報のみならず、関連が曖昧な情報やふと気になる情報断片をも多数かき集める。こうして収集した情報断片を、収束的思考過程において統合していく。この際、一見関連が不明な情報断片同士の間新たな関連を見出したとき、人は新たな発想を得ることができる。

【0004】

【発明が解決しようとする課題】いくつかの発想法などでは、意図的にこの両過程を明確に分離することによってより効果的に発想を得ようとする。たとえば、ブレインストーミングは主に発散的思考を効果的に行なうための手法であり、またKJ法は収束的思考を効果的に行なうための手法である。

【0005】一方、日常的に行なわれる対話ではこの両者が区別されることは通常ない。しかし、見方を変えれば日常の対話はこの発散的過程と収束的過程とを混合したものと考えられる。つまり、参加者達の発言によってさまざまな情報が提供される（発散的過程）。ここである参加者が提供された情報断片相互あるいは提供された情報断片と自分の持つ知識の中のある情報とに何らかの関連性を見出したとき（収束的過程）、この参加者は発見した関連性に基づく新しい話題を提示し、対話は新たな局面へと展開する。こうして発散と収束の過程を繰返すことによって対話は次々と進行する。

【0006】それゆえに、この発明の主たる目的は、参加している対話を常に活性化し、これによって対話の創造性をより強力なものとするようにした話題処理装置を提供することである。

【0007】

【課題を解決するための手段】請求項1に係る発明は、複数の話者による対話を活性化するための話題処理装置であって、各参加者の個々の発言を発言オブジェクトとして形態素解析を行ない、その結果から所定の種類の単語のみをキーワードとして抽出するキーワード抽出手段と、抽出された各キーワードの出現頻度ならびに出現間隔に基づき、各発言オブジェクトについてそれに含まれた各キーワードの重みを評価するキーワード重み計算手段と、得られたキーワードおよびそれらの重みに基づき、ある時点までのすべての発言オブジェクト相互の関連性を各発言オブジェクトが含むキーワード群の共有関係を用いて計算し、一方ですべてのキーワード相互の関

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連性をそれらのキーワードの各発言オブジェクトにおける共起関係を用いて計算し、その結果発言オブジェクト相互ならびにキーワード相互の関係を空間的構造として表現することにより対話内容を構造化する対話構造化手段と、得られた対話内容構造から特に発言オブジェクトが密集している部分の空間位置情報を求めることによってその時点までの対話における主要話題を検出する主要話題検出手段とを備えて構成される。

【0008】請求項2に係る発明は、複数の話者による対話を活性化するための話題処理装置であって、請求項1のキーワード抽出手段とキーワード重み計算手段と対話構造化手段とを含み、さらに得られた対話内容構造から発言オブジェクトが存在しない空白領域の位置情報を求めることによってその時点までの対話における話題の空白領域を検出する話題空白領域検出手段を備えて構成される。

【0009】請求項3に係る発明では、請求項2の各構成に加えて、さらに得られた対話内容構造から特に発言オブジェクトが密集している部分の空間位置情報を求めることによって、その時点までの対話における主要話題を検出する主要話題検出手段を含む。

【0010】請求項4に係る発明では、請求項1または請求項3の各構成に加えて、さらに主要話題検出手段によって把握された主要話題の空間位置近傍に位置するキーワードを所定数集め、これらのキーワードの重みを主要話題の空間位置からの距離に応じて評価する主要話題関連キーワード抽出手段と、得られたキーワード群に基づき、連想辞書を用いて連想キーワード群を想起する連想想起手段と、想起された連想キーワード群を用いてデータベースから関連情報を検索抽出する主要話題関連情報抽出手段を含む。

【0011】請求項5に係る発明では、請求項2または請求項3の各構成に加えて、さらに話題空白領域検出手段によって把握された話題空白領域の近傍に位置するキーワードを所定数集め、これらのキーワードの重みを話題空白領域からの距離に応じて評価する空白領域周辺キーワード抽出手段と、得られたキーワード群を用いてデータベースから関連情報を検索抽出する空白領域関連情報抽出手段を含む。

【0012】請求項6に係る発明では、請求項3の構成に加えて、さらに主要話題検出手段によって把握された主要話題の空間位置近傍に位置するキーワードを所定数集め、これらのキーワードの重みを主要話題の空間位置からの距離に応じて評価する主要話題関連キーワード抽出手段と、得られたキーワード群に基づき、連想辞書を用いて連想キーワード群を想起する連想想起手段と、想起された連想キーワード群を用いてデータベースから関連情報を検索抽出する主要話題関連情報抽出手段と、把握された話題空白領域の近傍に位置するキーワードを所定数集め、これらのキーワードの重みを話題空白領域か

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らの距離に応じて評価する空白領域周辺キーワード抽出手段と、得られたキーワード群を用いてデータベースから関連情報を検索抽出する空白領域関連情報抽出手段を含む。

【0013】

【発明の実施の形態】図1はこの発明の一実施形態を示すブロック図である。図1において、発言文がテキストデータとして入力され、順次入力される個々のテキストをそれぞれ1つの発言オブジェクトと称する。この発言オブジェクトは発言文処理モジュール1と話題構造化モジュール2とに与えられる。発言文処理モジュール1は構文解析モジュール11とキーワード重み計算モジュール12とを含み、構文解析モジュール11は入力された発言オブジェクトを形態素解析し、キーワード群を抽出する。このキーワード群は話題構造化モジュール2に与えられるとともに、キーワード重み計算モジュール12に与えられる。キーワード重み計算モジュール12は各キーワードの重みを計算し、話題構造化モジュール2に与える。

【0014】話題構造化モジュール2は、その時点までに得られたキーワードオブジェクトと発言オブジェクトとの関連を反映して、これらを2次元空間上に配置し、対話の内容を構造化する。発言オブジェクト/キーワードオブジェクトの2次元空間配置情報は話題展開状況認識モジュール3に与えられる。話題展開状況認識モジュール3は主要話題検出モジュール31と話題空白領域検出モジュール32とを含み、主要話題検出モジュール31は主要話題の位置を検出し、話題空白領域検出モジュール32は話題空白位置を検出する。

【0015】図2は図1に示した話題構造化モジュール2と話題展開状況認識モジュール3の動作を説明するためのフローチャートである。

【0016】次に、図1および図2を参照して、この発明の一実施形態の具体的な動作について説明する。発言文処理モジュール1の構文解析モジュール11は入力された発言オブジェクトを構文解析し、各単語の品詞を決定する。次いで、名詞および品詞を決定できなかった語のみを抽出し、この語群をその発言オブジェクトのキーワードとする。そして、キーワード重み計算モジュール12は第n発言オブジェクトにおけるキーワード w_i の重み $W_{wi,n}$ を次式によって求める。

【0017】

【数1】

$$W_{wi,n} = \frac{\left(1 + \frac{1}{1 + e^{-f_{wi,n} + F_1}}\right) \left(1 + \frac{1}{1 + e^{-i_{wi,n} + I}}\right)}{\left(1 + \frac{1}{1 + e^{-f_{wi} + F_1}}\right)^2}$$

【0018】ただし、 f_{wi} は第n-1発言オブジェクト

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までで w_i がいくつかの発言オブジェクトに出現したか、 $f_{wi,n}$ は第n発言オブジェクトに w_i がいくつか現れたか、 $i_{wi,n}$ は w_i が第n発言オブジェクトの何発言前に最近使用されたかを示す。また、 F_1 、 I は定数であり、経験的にそれぞれ5、1、10の値を与える。

【0019】このような重み付けとした理由は、次の点にある。まず、出現頻度が高いキーワードは、どんな対話においても一般的に使用される語であるか、あるいはその対話の全体的な話題にかかわる語のいずれかであり、いずれにせよ話題の構造化における重要度が低い。もしこのような語が大きな重みを持つと、後で述べる話題の構造化段階において各話題クラスを不明瞭にしてしまう可能性がある。

【0020】1発言中に多数出現する語はその発言での重要度が高い、高頻度語であってもしばらく使用されなかった後に使用される場合は重要度が高い、という考えに基づく。

【0021】次に、話題構造化モジュール2は図2に示すステップ（図示ではSPと略称する）SP1において、各発言オブジェクトのキーワードオブジェクトの共有関係、逆に言えば各キーワードオブジェクトの発言オブジェクトでの共起関係を用いて双対尺度法に基づいて、各オブジェクト相互の距離を求める。ここで、双対尺度法とは、複数の数量化属性で構成されたオブジェクト集合が与えられたときに、オブジェクト集合と属性集合にそれぞれ得点数量を与えることによって、オブジェクト同士の属性共有性と属性同士の共起性を空間における相対的な位置関係として表現する手法である。ステップSP2において、空間構造を定量化する主成分のうち寄与度の高い上位2つを抽出し、各オブジェクトの2次元空間上での位置情報を決定する。

【0022】話題展開状況認識モジュール3の主要話題検出モジュール31はステップSP3において、2次元空間を 16×16 のセルに分割する。そして、ステップSP4において第nセルについて、そのセル自身とその周りの8つのセルに含まれる発言オブジェクトの個数の平均を求め、これを第nセルの重みとする。これを 16×16 の全セルについて計算する。ステップSP5において重みが所定のしきい値 θ を越えるセルを選び、これを主要話題セルと見なし、それらのセルの中心の座標を出力する。

【0023】一方、話題空白領域検出モジュール32はステップSP6において、重みがゼロのセルが存在する領域については、ユークリッド距離変換手法などを適用することにより、その領域の中心位置とその中心の重み（重みゼロでないセル領域からの距離、遠いほど重みが大きくなる）を求める。ユークリッド距離変換手法とは、空間上での領域中心とその中心の周辺からの距離を求める手法である。この結果、重みが所定のしきい値 θ を越える空白領域中心を選び、これを話題空白中心と見

なし、それらの領域中心の座標を出力する。

【0024】上述のごとく、この実施形態によって、主要話題の位置と話題空白位置を検出することができる。

【0025】図3はこの発明の他の実施形態を示すブロック図である。図3において、発言文処理モジュール1と話題構造化モジュール2と話題展開状況認識モジュール3は図1と同様であり、さらにこの発明の実施形態では、話題提供モジュール起動モジュール（話題転換検出モジュール）4と話題提供モジュール5とが設けられる。話題提供モジュール起動モジュール4は話題転換点

を検出し、話題提供モジュール5は話題転換検出モジュール4から指示されるタイミングで、状況に応じた話題の種となる情報を抽出して利用者に提供する。このために、話題提供モジュール5はキーワード抽出および重み計算モジュール51と記事データベース検索モジュール52と連想想起モジュール53とを含む。

【0026】図4は図3に示した話題提供モジュール5の動作を説明するためのフローチャートである。なお、図3における発言文処理モジュール1と話題構造化モジュール2と話題展開状況認識モジュール3は図1と同様の動作を行ない、主要話題位置と話題空白位置を検出して話題提供モジュール5に与える。話題提供モジュール5はステップSP11において話題提供モジュール起動モジュール4から起動命令が来たか否かを判別し、起動命令が来なければ待機し、起動命令が来れば、ステップSP12において話題展開状況認識モジュール3から話題空白位置を検出されたか否かを判別する。

【0027】話題空白領域があれば、ステップSP13において最近入力された発言オブジェクトに最も近い話題空白領域中心を探し、ステップSP14においてキーワード抽出および重み計算モジュール51が話題空白領域中心に近いものから順に所定数m個のキーワードオブジェクトを集める。同時に、各キーワードオブジェクトについて話題空白領域中心からの距離に反比例する重みを求める。そして、ステップSP15において、獲得した重み付けキーワード群を検索キーワード群とする。ステップSP16において、検索キーワード群を用いて、記事データベース検索モジュール52が持つ記事データベース検索を行ない、検索結果を提供する。

【0028】前述のステップSP12において、話題空白領域がなければ、ステップSP17において最近入力された発言オブジェクトに最も近い主要話題セルを探す。そして、キーワード抽出および重み計算モジュール51がステップSP18において主要話題セル中心に近いものから順に、所定数m個のキーワードオブジェクトを集める。同時に、各キーワードオブジェクトについて主要話題セル中心からの距離に反比例する重みを求める。連想想起モジュール53はステップSP19において、求めた重み付けキーワード群を用いて、予めシステムが持っている連想事象によって連想想起を行ない、連

想キーワード群を得る。そして、ステップSP20において、獲得した連想キーワード群を検索キーワード群として、ステップSP16において、検索キーワード群を用いて、記事データベース検索モジュール52の記事データベース検索を行なって検索結果を提供する。

【0029】

【発明の効果】以上のように、この発明によれば、各参加者の個々の発言を発言オブジェクトとして形態素解析を行ない、その結果から所定の種類の単語のみをキーワードとして抽出し、抽出した各キーワードの出現頻度ならびに出現間隔に基づき、各発言オブジェクトについてそれに含まれた各キーワードの重みを評価し、得られたキーワードおよびそれらの重みに基づいて、ある時点までのすべての発言オブジェクト相互の関連性を各発言オブジェクトが含むキーワード群の共有関係を用いて計算し、一方ですべてのキーワード相互の関連性をそれらのキーワードの各発言オブジェクトにおける共起関係を用いて計算し、その発言オブジェクト相互ならびにキーワード相互の関係を空間的構造として表現することにより対話内容を構造化し、その対話内容構造から特に発言オブジェクトが密集している部分の空間位置情報を求めることによって、その時点までの対話における主要話題を検出するようにしたので、どんなタイプの対話についても話題の獲得処理が可能となり、しかも空白領域を検出することによって新たな話題の展開方向を見出すことができる。しかも、目的思考型のみならず、自由展開型対話についても話題の獲得が可能となり、予めプランとして新たに展開すべき話題の方向を設定する必要がなく、対話の状況に応じてその状況そのものから新たな展開方向を獲得することが可能となる。

【図面の簡単な説明】

【図1】この発明の一実施形態の概略ブロック図である。

【図2】図1に示した話題構造化モジュールと話題展開状況認識モジュールの動作を説明するためのフローチャートである。

【図3】この発明の他の実施形態を示すブロック図である。

【図4】図3に示した話題提供モジュールの動作を説明するためのフローチャートである。

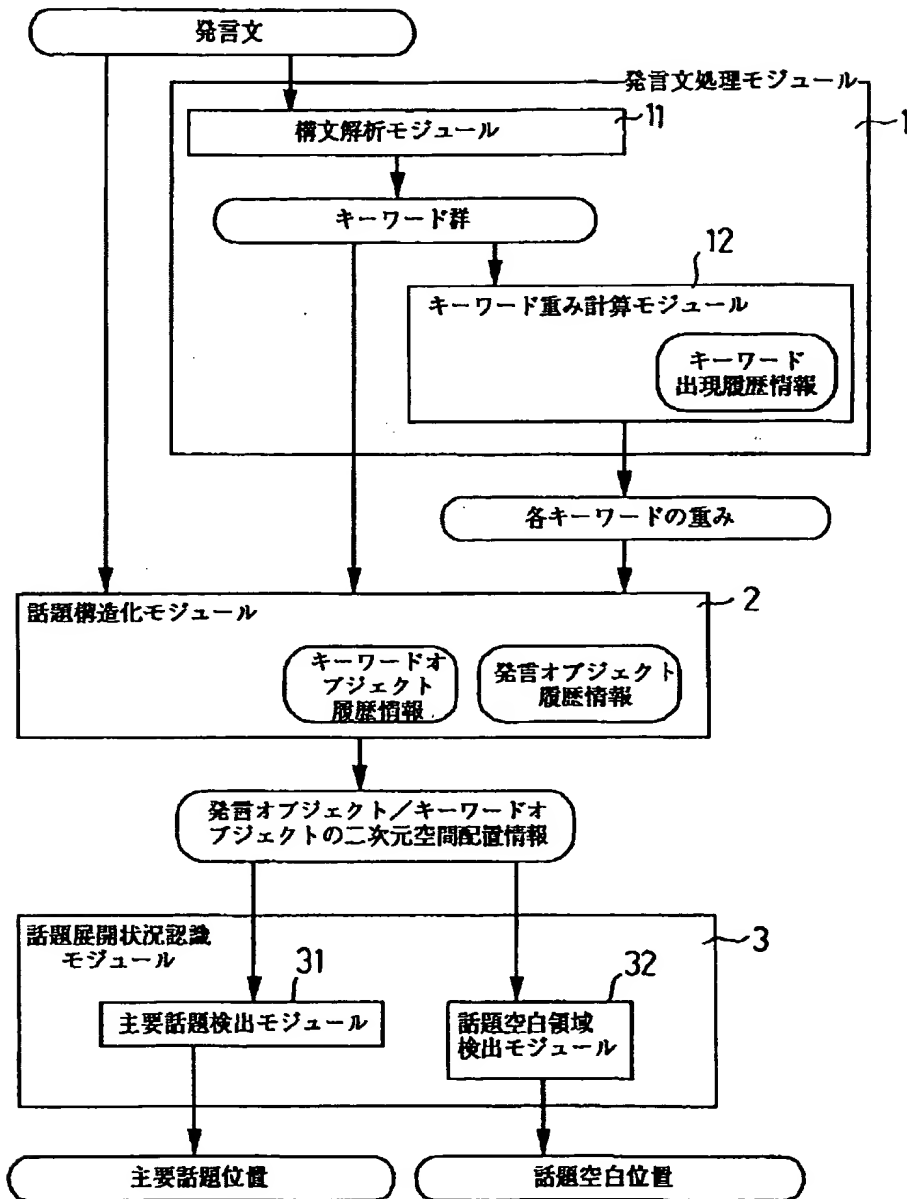
【符号の説明】

- 1 発言文処理モジュール
- 2 話題構造化モジュール
- 3 話題展開状況認識モジュール
- 4 話題提供モジュール起動モジュール
- 5 話題提供モジュール
- 11 構文解析モジュール
- 12 キーワード重み計算モジュール
- 31 主要話題検出モジュール
- 32 話題空白領域検出モジュール

51 キーワード抽出および重み計算モジュール
52 記事データベース検索モジュール

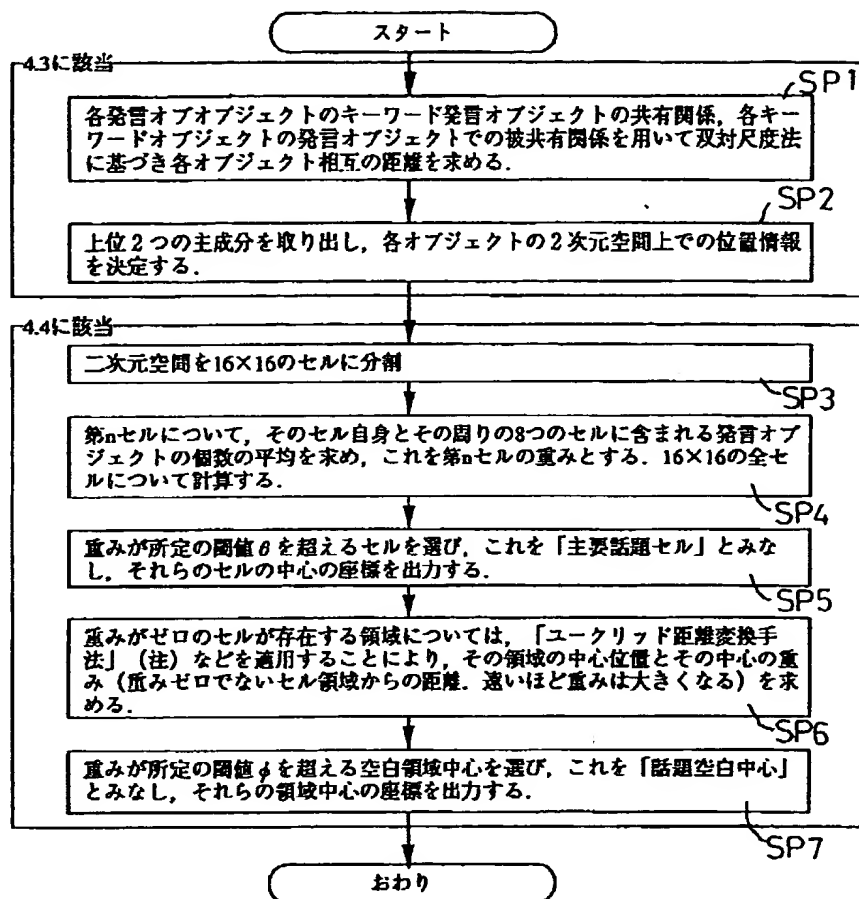
53 連想起起モジュール

【図1】

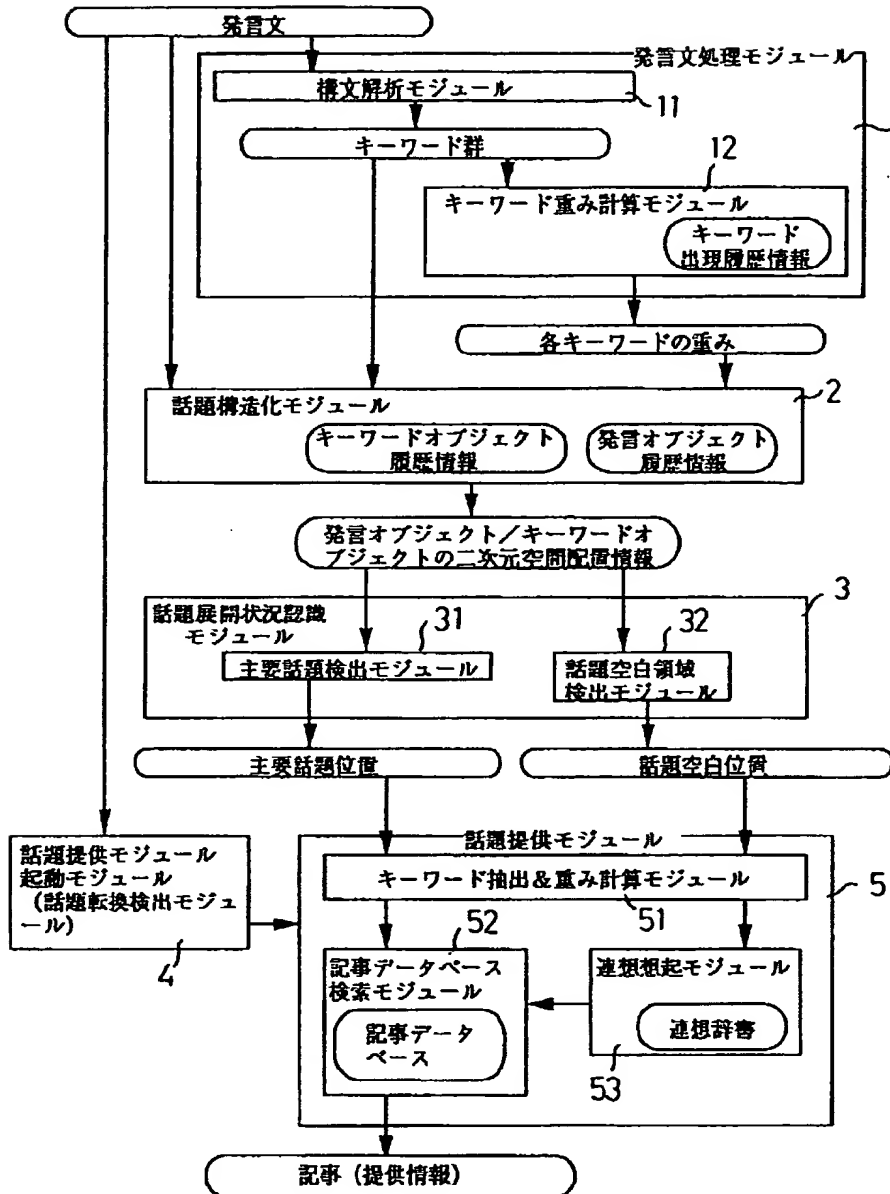


【図2】

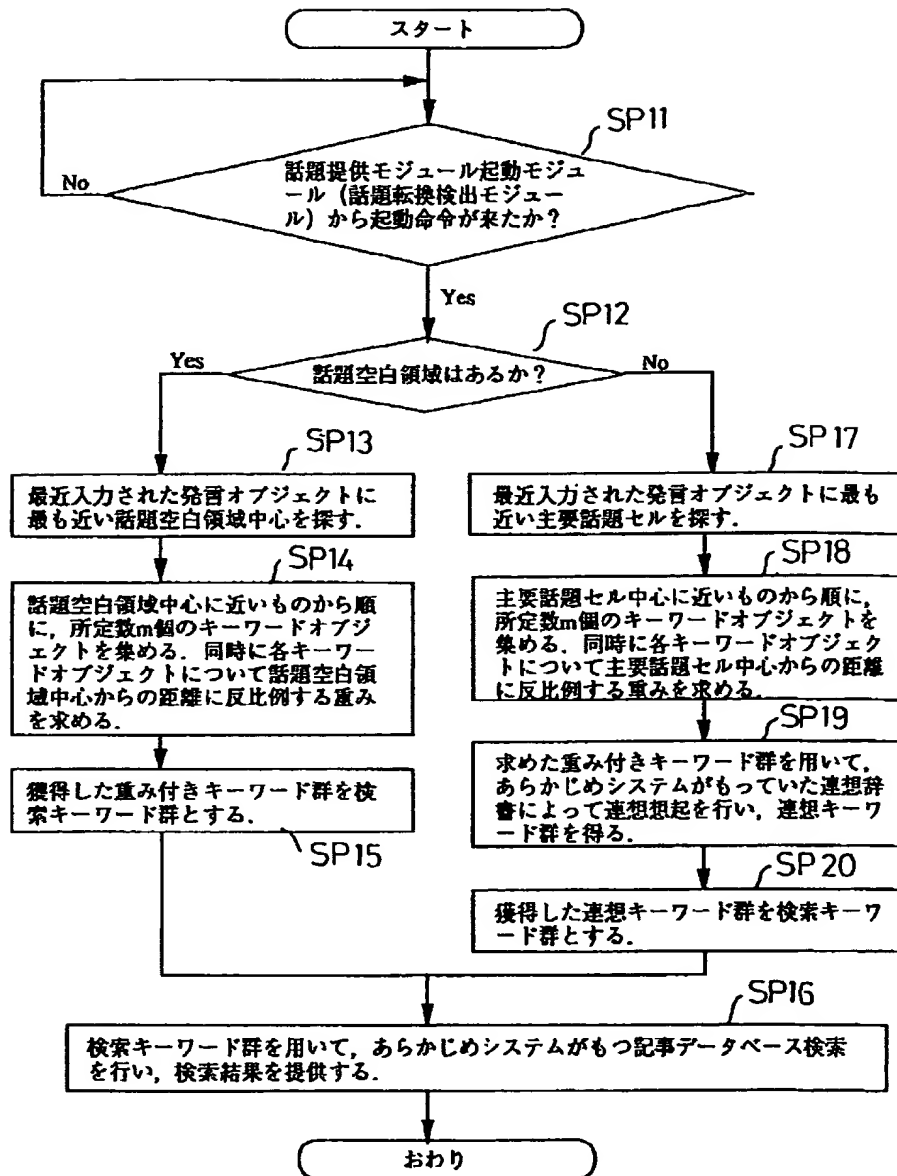
4.3と4.4のアルゴリズム (フローチャート)



【図3】



【図4】



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : ATR CHINOU EIZO TSUSHIN
KENKYUSHO:KK

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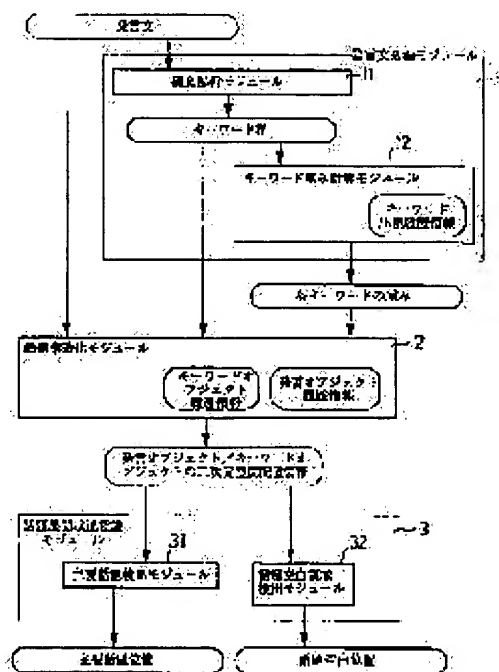
(72)Inventor : NISHIMOTO KAZUSHI
SUMI YASUYUKI

(54) TOPIC PROCESSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a topic processor for making the creativity of a conversation be stronger by activating a participating conversation at all times.

SOLUTION: The speech objects of respective participants are morpheme- analyzed and a key word is extracted by a speech sentence processing module 1 and the relation of the key word and the speech objects is successively arranged on a two-dimensional space and the contents of the conversation is structured by a topic structuring module 2. Then, the developing conditions of a topic are recognized from the contents of the conversation and the transition information of speeches by a topic developing condition recognition module 3, and in response to the detection of topic change by a topic providing module activation module 4, a topic providing module 5 extracts and provides information to be the subject of the topic.



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3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Are a subject processor for activating the dialog by two or more speakers, and morphological analysis is performed by making each remark of each participant an utterance object. A keyword extraction means to extract only the word of a predetermined kind from the result as a keyword, It is based on the frequency-of-occurrence row of each keyword extracted by the aforementioned keyword extraction means at appearance interval. A keyword weight calculation means to evaluate the weight of each keyword contained in it about each utterance object, It is based on the keywords obtained by the aforementioned keyword extraction means row by the aforementioned keyword weight calculation means, and those weight. It calculates using the share relation of the keyword group which each utterance object including the relevance between all utterance objects of a certain time contains. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. A dialog structuring means to structure the content of a dialog by as a result expressing the relation between keywords as a conformation in both the utterance object row, And the subject processor equipped with a main subject detection means to detect the main subjects in the dialog of the time by searching for the spatial position information on a portion that it is crowded with utterance objects from especially the content structure of a dialog acquired by the aforementioned dialog structuring means.

[Claim 2] Are a subject processor for activating the dialog by two or more speakers, and morphological analysis is performed by making each remark of each participant an utterance object. A keyword extraction means to extract only the word of a predetermined kind from the result as a keyword, It is based on the frequency-of-occurrence row of each keyword extracted by the aforementioned keyword extraction means at appearance interval. A keyword weight calculation means to evaluate the weight of each keyword contained in it about each utterance object, It is based on the keywords obtained by the aforementioned keyword extraction means row by the aforementioned keyword weight calculation means, and those weight. The relevance between all utterance objects of a certain time is calculated using the share relation of the keyword group which each utterance object contains. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. A dialog structuring means to structure the content of a dialog by as a result expressing the relation between keywords as a conformation in both the utterance object row, And the subject processor equipped with a subject blank field detection means to detect the blank field of the subject in the dialog of the time by asking for the positional information of the blank field where an utterance object does not exist from the content structure of a dialog acquired by the aforementioned dialog structuring means.

[Claim 3] Furthermore, the subject processor of a claim 2 equipped with a main subject detection means to detect the main subjects in the dialog of the time by searching for the spatial position information on a portion that it is crowded with utterance objects from especially the content structure of a dialog acquired by the aforementioned dialog structuring means.

[Claim 4] The keyword located near the spatial position of the main subjects grasped by the

aforementioned main subject detection means Furthermore, eye the collection of predetermined numbers, A main subject related keyword extraction means to evaluate the weight of these keywords according to the distance from the spatial position of main subjects, It is based on the keyword group obtained by the aforementioned main subject related keyword extraction means. The subject processor of the claim 1 or a claim 3 equipped with an associative remembrance means to recollect an associative keyword group using an associative dictionary, and the main subject related information extraction means which carries out reference extraction of the related information from a database using the associative keyword group recollected by the aforementioned associative remembrance means.

[Claim 5] Furthermore, the subject processor of the claim 2 or a claim 3 equipped with the blank field related-information extraction means which carries out reference extraction of the related information from a database using the keyword group obtained by blank field circumference keyword extraction means to evaluate the weight of eyes the collection of predetermined numbers, and these keywords for the keyword located near the subject blank field grasped by the aforementioned subject blank field detection means according to the distance from a subject blank field, and the aforementioned blank field circumference keyword extraction means.

[Claim 6] The keyword located near the spatial position of the main subjects grasped by the aforementioned main subject detection means Furthermore, eye the collection of predetermined numbers, A main subject related keyword extraction means to evaluate the weight of these keywords according to the distance from the spatial position of main subjects, It is based on the keyword group obtained by the aforementioned main subject related keyword extraction means. An associative remembrance means to recollect an associative keyword group using an associative dictionary, the main subject related information extraction means which carries out reference extraction of the related information from a database using the associative keyword group recollected by the aforementioned associative remembrance means, The keyword located near the subject blank field grasped by the aforementioned subject blank field detection means Eye the collection of predetermined numbers, A blank field circumference keyword extraction means to evaluate the weight of these keywords according to the distance from a subject blank field, And the subject processor of a claim 3 equipped with the blank field related information extraction means which carries out reference extraction of the related information from a database using the keyword group obtained by the aforementioned blank field circumference keyword extraction means.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the subject processor for activating the dialog by two or more participants especially about a subject processor.

[0002]

[Description of the Prior Art] In order to obtain the new way of thinking, it can be considered that a dialog is a very effective creative action. In a society, symposium, etc., the designer and chairman often say, "An active argument is expected" because it is premised [one] on that there is such an effect to the argument. moreover, a researcher exchanges in a researcher's lounge -- also escaping death -- it is what is often experienced that new information is acquired out of the dialog which is not, and that the hint of the new way of thinking or a problem solving is obtained

[0003] It is said that there is two important process among the process of the way of thinking of people. One is divergent-thinking process and another is convergent-thinking process. People first gather up clearly not only the information relevant to the problem but many information with ambiguous relation and the information fragments worried suddenly in divergent-thinking process to a certain unknown problem of a solution. In this way, the collected information fragments are unified in convergent-thinking process. Under the present circumstances, when new relation is apparently found out among information fragments with unknown relation, people can get the new way of thinking.

[0004]

[Problem(s) to be Solved by the Invention] In some ways of thinking, it is going to obtain the way of thinking more effectively by separating both this process clearly intentionally. For example, brainstorming is the technique for mainly performing divergent thinking effectively, and a KJ method is the technique for performing convergent thinking effectively.

[0005] In the dialog performed daily on the other hand, these both are not usually distinguished.

However, if a view is changed, it will be thought that the everyday dialog mixed this diffusive process and convergence-process. That is, various information is offered by participants' remark (diffusive process). When a certain relevance is found out to both the information fragments or the offered information fragment with which the participant which it is here was offered, and a certain information in the knowledge which he has (convergence-process), this participant presents the new subject based on the discovered relevance, and develops a dialog to a new aspect of affairs. In this way, a dialog advances one after another by repeating the process of emission and convergence.

[0006] So, the main purpose of this invention is offering the subject processor which always activates the dialog which has participated and was made to make creativity of a dialog more powerful by this.

[0007]

[Means for Solving the Problem] Invention concerning a claim 1 is a subject processor for activating the dialog by two or more speakers. A keyword extraction means to perform morphological analysis by making each remark of each participant an utterance object, and to extract only the word of a predetermined kind from the result as a keyword, A keyword weight calculation means to evaluate the

weight of each keyword contained in the frequency-of-occurrence row of each extracted keyword about each utterance object at it based on the appearance interval, Based on the obtained keywords and those weight, it calculates using the share relation of the keyword group in which each utterance object includes the relevance between all utterance objects of a certain time. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. A dialog structuring means to structure the content of a dialog by as a result expressing the relation between keywords as a conformation in both the utterance object row, By searching for the spatial position information on a portion that it is crowded with utterance objects from especially the acquired content structure of a dialog, it has a main subject detection means to detect the main subjects in the dialog of the time, and is constituted.

[0008] Invention concerning a claim 2 is a subject processor for activating the dialog by two or more speakers, is equipped with a subject blank field detection means detect the blank field of the subject in the dialog of the time, and is constituted by asking for the positional information of the blank field where an utterance object does not exist from the content structure of a dialog acquired further including the keyword extraction means, the keyword weight calculation means, and the dialog structuring means of a claim 1.

[0009] A main subject detection means to detect the main subjects in the dialog of the time is included by searching for the spatial position information on a portion that the utterance object is close with invention concerning a claim 3 from especially the content structure of a dialog acquired further in addition to each composition of a claim 2.

[0010] In invention concerning a claim 4, it adds to each composition of a claim 1 or a claim 3. A main subject related keyword extraction means to evaluate the weight of eyes the collection of predetermined numbers, and these keywords for the keyword located near the spatial position of the main subjects furthermore grasped by the main subject detection means according to the distance from the spatial position of main subjects, Based on the obtained keyword group, an associative remembrance means to recollect an associative keyword group using an associative dictionary, and the main subject related information extraction means which carries out reference extraction of the related information from a database using the recollected associative keyword group are included.

[0011] invention concerning a claim 5 -- each composition of a claim 2 or a claim 3 -- in addition, a blank field circumference keyword extraction means evaluate the weight of eyes the collection of predetermined numbers and these keywords for the keyword located near the subject blank field further grasped by the subject blank field detection means according to the distance from a subject blank field, and the blank field related information extraction means which carries out reference extraction of the related information from a database using the obtained keyword group are included

[0012] The keyword which is located in invention concerning a claim 6 near the spatial position of the main subjects further grasped by the main subject detection means in addition to the composition of a claim 3 Eye the collection of predetermined numbers, A main subject related keyword extraction means to evaluate the weight of these keywords according to the distance from the spatial position of main subjects, An associative remembrance means to recollect an associative keyword group using an associative dictionary based on the obtained keyword group, The main subject related information extraction means which carries out reference extraction of the related information from a database using the recollected associative keyword group, A blank field circumference keyword extraction means to evaluate the weight of eyes the collection of predetermined numbers, and these keywords for the keyword located near the grasped subject blank field according to the distance from a subject blank field, The blank field related information extraction means which carries out reference extraction of the related information from a database using the obtained keyword group is included.

[0013]

[Embodiments of the Invention] Drawing 1 is the block diagram showing 1 operation gestalt of this invention. In drawing 1, each text into which an utterance sentence is inputted into as text data, and is inputted one by one is called one utterance object, respectively. This utterance object is given to the utterance sentence processing module 1 and the subject structural module 2. Including the syntax-

analysis module 11 and the keyword weight calculation module 12, the syntax-analysis module 11 carries out morphological analysis of the inputted utterance object, and the utterance sentence processing module 1 extracts a keyword group. This keyword group is given to the keyword weight calculation module 12 while it is given to the subject structural module 2. The keyword weight calculation module 12 calculates the weight of each keyword, and gives it to the subject structural module 2.

[0014] Reflecting the relation of the keyword object and utterance object which were obtained by the point in time, the subject structural module 2 arranges these on two-dimensional space, and structures the content of a dialog. The two-dimensional spacial configuration information on an utterance object / keyword object is given to the subject expansion situation-recognition module 3. In the subject expansion situation-recognition module 3, including the main subject detection module 31 and the subject blank field detection module 32, the main subject detection module 31 detects the position of main subjects, and the subject blank field detection module 32 detects a subject blank position.

[0015] Drawing 2 is a flow chart for explaining operation of the subject structural module 2 and the subject expansion situation-recognition module 3 which were shown in drawing 1.

[0016] Next, with reference to drawing 1 and drawing 2, concrete operation of 1 operation gestalt of this invention is explained. The syntax-analysis module 11 of the utterance sentence processing module 1 analyzes the syntax of the inputted utterance object, and determines the part of speech of each word. Subsequently, only the word which has not determined a noun and a part of speech is taken out, and let this word group be the keyword of the utterance object. And the keyword weight calculation module 12 is the keyword w_i in the n -th utterance object. It asks for weight W_{wi} and n by the following formula.

[0017]

[Equation 1]

$$W_{wi,n} = \frac{\left(1 + \frac{1}{1 + e^{-f_{wi,n} + F_1}}\right) \left(1 + \frac{1}{1 + e^{-i_{wi,n} + I}}\right)}{\left(1 + \frac{1}{1 + e^{-f_{wi} + F_0}}\right)^2}$$

[0018] however, f_{wi} -- the -- up to a $n-1$ utterance object -- w_i or it appeared in how many utterance objects -- f_{wi} and n -- the n -th utterance object -- w_i how many it appeared, and i_{wi} and n -- w_i It is shown whether it was used before how many shot word of the n -th utterance object recently. Moreover, F_0 , F_1 , and I are constants and give the value of 5, 1, and 10 experientially, respectively.

[0019] The reason made into such weighting is in the following point. First, the keyword with the high frequency of occurrence is a word generally used in any dialogs, or is either of the words in connection with the overall subject of the dialog, and its significance in the structuralization of subject is low anyway. If such a word has big weight, in the structuring stage of the subject described later, each subject cluster may be made not clear.

[0020] It is based on the idea that its significance is high when being used, after it is not used for a while, even if the word which appear during 1 utterance was a high frequency word with a high significance in the utterance.

[0021] Next, in the step (in illustration, it is called SP for short) SP 1 shown in drawing 2, the subject structural module 2 will find the distance between each object based on a duality scale method using the coincidence relation in the utterance object of each keyword object, if it says to the share relation of the keyword object of each utterance object, and reverse. Here, a duality scale method is the technique of expressing the attribute share nature of objects, and the coincidence nature of attributes as relative physical relationship in space by giving the amount of points to an object set and an attribute set, respectively, when the object set which consisted of two or more quantification attributes is given. In a step SP 2, two high orders with the high degree of contribution are taken out among the principal components which quantify space structure, and the positional information on the two-dimensional space of each object is determined.

[0022] The main subject detection module 31 of the subject expansion situation-recognition module 3 divides two-dimensional space into the cell of 16x16 in a step SP 3. And it asks for the average of the number of the utterance object contained in the cell itself and eight cells around it about the n-th cell in a step SP 4, and let this be the weight of the n-th cell. This is calculated about all the cells of 16x16. The cell in which weight exceeds predetermined threshold θ in a step SP 5 is chosen, it considers that this is a main subject cell, and the coordinate of the center of those cells is outputted.

[0023] On the other hand, when the subject blank field detection module 32 applies the Euclid distance transform technique etc. about the field where the cell of zero exists [weight] in a step SP 6, it asks for the center position and the weight of a center of the field (the distance from the cell field which is not weight zero, and far from fire weight become large). The Euclid distance transform technique is the technique of finding the distance from the circumference of the field center and center on space.

Consequently, weight chooses the blank field center exceeding predetermined threshold ϕ , considers that this is a subject blank center, and outputs the coordinate based on [those] fields.

[0024] Like ****, the position and subject blank position of main subjects are detectable with this operation form.

[0025] Drawing 3 is the block diagram showing other operation forms of this invention. In drawing 3, the utterance sentence processing module 1, the subject structural module 2, and the subject expansion situation-recognition module 3 are the same as that of drawing 1, and the subject offer module starting module (subject conversion detection module) 4 and the subject offer module 5 are further formed with the operation form of this invention. The subject offer module starting module 4 detects the subject commutation point, and it is the timing directed from the subject conversion detection module 4, and the subject offer module 5 extracts the information used as the kind of subject according to the situation, and it provides a user with it. For this reason, the subject offer module 5 contains keyword extraction and the weight calculation module 51, the report database reference module 52, and the associative remembrance module 53.

[0026] Drawing 4 is a flow chart for explaining operation of the subject offer module 5 shown in drawing 3. In addition, the utterance sentence processing module 1 and the subject structural module 2 in drawing 3, and the subject expansion situation-recognition module 3 perform the same operation as drawing 1, detect a main subject position and a subject blank position, and give them to the subject offer module 5. The subject offer module 5 distinguishes whether in a step SP 11, the starting instruction came from the subject offer module starting module 4, and if it stands by if a starting instruction does not come, and a starting instruction comes, it will distinguish whether in a step SP 12, the subject blank position was detected from the subject expansion situation-recognition module 3.

[0027] If there is a subject blank field, the subject blank field center near the utterance object inputted in a step SP 13 recently will be looked for, and keyword extraction and the weight calculation module 51 will collect the keyword objects of m predetermined numbers sequentially from a near thing in a step SP 14 centering on a subject blank field. Simultaneously, it asks for the weight which is in inverse proportion to distance from a subject blank field center about each keyword object. And let the gained weighting keyword group be a reference keyword group in a step SP 15. In a step SP 16, report database reference which the report database reference module 52 has is performed using a reference keyword group, and a reference result is offered.

[0028] In the above-mentioned step SP 12, if there is no subject blank field, the main subject cell near the utterance object inputted in a step SP 17 recently will be looked for. And keyword extraction and the weight calculation module 51 collect the keyword objects of m predetermined numbers sequentially from a near thing in a step SP 18 focusing on a main subject cell. Simultaneously, it asks for the weight which is in inverse proportion to distance from a main subject cell center about each keyword object. In a step SP 19, using the weighting keyword group for which it asked, the associative remembrance module 53 performs associative remembrance, and obtains an associative keyword group according to the associative event which the system has beforehand. And in a step SP 16, using a reference keyword group, report database reference of the report database reference module 52 is performed, and a reference result is offered by making the gained associative keyword group into a reference keyword

group in a step SP 20.

[0029]

[Effect of the Invention] As mentioned above, according to this invention, morphological analysis is performed by making each remark of each participant an utterance object. From the result, extract only the word of a predetermined kind as a keyword and it is based on the frequency-of-occurrence row of each extracted keyword at appearance interval. The weight of each keyword contained in it about each utterance object is evaluated. Based on the obtained keywords and those weight, it calculates using the share relation of the keyword group in which each utterance object includes the relevance between all utterance objects of a certain time. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. By structuring the contents of a dialog and searching for the spatial position information on a portion that it is crowded with utterance objects from especially the contents structure of a dialog, by expressing the relation between keywords as a conformation in the utterance object both row Since the main subjects in the dialog of the time were detected, acquisition processing of subject is attained also about what type of dialog, and the expansion direction of new subject can be found out by moreover detecting a blank field. And acquisition of subject is attained not only about the purpose thinking type but about a free expansion type dialog, and it is not necessary to set up the direction of the subject which should newly be beforehand developed as a plan, and it becomes possible to gain the new expansion direction from the situation itself according to the situation of a dialog.

[Translation done.]

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to the subject processor for activating the dialog by two or more participants especially about a subject processor.

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PRIOR ART

[Description of the Prior Art] In order to obtain the new way of thinking, it can be considered that a dialog is a very effective creative act. In a society, symposium, etc., the designer and chairman often say, "An active argument is expected" because it is premised [one] on that there is such an effect to the argument. moreover, a researcher exchanges in a researcher's lounge -- also escaping death -- it is what is often experienced that new information is acquired out of the dialog which is not, and that the hint of the new way of thinking or a problem solving is obtained

[0003] It is said that there is two important process among the process of the way of thinking of people. One is a diffusive thinking process and another is a convergence-thinking process. People first gather up clearly not only the information relevant to the problem but many information with ambiguous relation and the information fragments worried suddenly in a diffusive thinking process to a certain unknown problem of a solution. In this way, the collected information fragments are unified in the convergence-thinking process. Under the present circumstances, when new relation is apparently found out among information fragments with unknown relation, people can get the new way of thinking.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, in this invention, morphological analysis is performed by making each remark of each participant an utterance object. From the result, extract only the word of a predetermined kind as a keyword and it is based on the frequency-of-occurrence row of each extracted keyword at appearance interval. The weight of each keyword contained in it about each utterance object is evaluated. Based on the obtained keywords and those weight, it calculates using the share relation of the keyword group in which each utterance object includes the relevance between all utterance objects of a certain time. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. By structuring the contents of a dialog and searching for the spatial position information on a portion that it is crowded with utterance objects from especially the contents structure of a dialog, by expressing the relation between keywords as a conformation in the utterance object both row The main subjects in the dialog of the time were detected. Therefore, acquisition processing of subject is attained also about what type of dialog, and the expansion direction of new subject can be found out by moreover detecting a blank field. And acquisition of subject is attained not only about the purpose thinking type but about a free expansion type dialog, and it is not necessary to set up the direction of the subject which should newly be beforehand developed as a plan, and it becomes possible to gain the new expansion direction from the situation itself according to the situation of a dialog.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In some ways of thinking, it is going to obtain the way of thinking more effectively by separating both this process clearly intentionally. For example, brainstorming is the technique for mainly performing diffusive thinking effectively, and a KJ method is the technique for performing convergence-thinking effectively.

[0005] In the dialog performed daily on the other hand, these both are not usually distinguished. However, if a view is changed, it will be thought that the everyday dialog mixed this diffusive process and convergence-process. That is, various information is offered by participants' remark (diffusive process). When a certain relevance is found out to both the information fragments or the offered information fragment with which the participant which it is here was offered, and a certain information in the knowledge which he has (convergence-process), this participant presents the new subject based on the discovered relevance, and develops a dialog to a new aspect of affairs. In this way, a dialog advances one after another by repeating the process of emission and convergence.

[0006] So, the main purpose of this invention is offering the subject processor which always activates the dialog which has participated and was made to make creativity of a dialog more powerful by this.

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MEANS

[Means for Solving the Problem] Invention concerning a claim 1 is a subject processor for activating the dialog by two or more speakers. A keyword extraction means to perform morphological analysis by making each remark of each participant an utterance object, and to extract only the word of a predetermined kind from the result as a keyword. A keyword weight calculation means to evaluate the weight of each keyword contained in the frequency-of-occurrence row of each extracted keyword about each utterance object at it based on the appearance interval. Based on the obtained keywords and those weight, it calculates using the share relation of the keyword group in which each utterance object includes the relevance between all utterance objects of a certain time. On the other hand, the relevance between all keywords is calculated using the coincidence relation to each utterance object of those keywords. A dialog structuring means to structure the content of a dialog by as a result expressing the relation between keywords as a conformation in both the utterance object row. By searching for the spatial position information on a portion that it is crowded with utterance objects from especially the acquired content structure of a dialog, it has a main subject detection means to detect the main subjects in the dialog of the time, and is constituted.

[0008] Invention concerning a claim 2 is a subject processor for activating the dialog by two or more speakers, is equipped with a subject blank field detection means detect the blank field of the subject in the dialog of the time, and is constituted by asking for the positional information of the blank field where an utterance object does not exist from the contents structure of a dialog acquired further including the keyword extraction means, the keyword weight calculation means, and the dialog structuring means of a claim 1.

[0009] A main subject detection means to detect the main subjects in the dialog of the time is included by searching for the spatial position information on a portion that the utterance object is close with invention concerning a claim 3 from especially the contents structure of a dialog acquired further in addition to each composition of a claim 2.

[0010] In invention concerning a claim 4, it adds to each composition of a claim 1 or a claim 3. A main subject related keyword extraction means to evaluate the weight of eyes the collection of predetermined numbers, and these keywords for the keyword located near the spatial position of the main subjects furthermore grasped by the main subject detection means according to the distance from the spatial position of main subjects. Based on the obtained keyword group, an associative remembrance means to recollect an associative keyword group using an associative dictionary, and the main subject related information extraction means which carries out reference extraction of the related information from a database using the recollected associative keyword group are included.

[0011] invention concerning a claim 5 -- each composition of a claim 2 or a claim 3 -- in addition, a blank field circumference keyword extraction means evaluate the weight of eyes the collection of predetermined numbers and these keywords for the keyword located near the subject blank field further grasped by the subject blank field detection means according to the distance from a subject blank field, and the blank field related-information extraction means which carries out reference extraction of the related information from a database using the obtained keyword group are included

[0012] The keyword which is located in invention concerning a claim 6 near the spatial position of the main subjects further grasped by the main subject detection means in addition to the composition of a claim 3 Eye the collection of predetermined numbers, A main subject related keyword extraction means to evaluate the weight of these keywords according to the distance from the spatial position of main subjects, An associative remembrance means to recollect an associative keyword group using an associative dictionary based on the obtained keyword group, The main subject related information extraction means which carries out reference extraction of the related information from a database using the recollected associative keyword group, A blank field circumference keyword extraction means to evaluate the weight of eyes the collection of predetermined numbers, and these keywords for the keyword located near the grasped subject blank field according to the distance from a subject blank field, The blank field related information extraction means which carries out reference extraction of the related information from a database using the obtained keyword group is included.

[0013]

[Embodiments of the Invention] Drawing 1 is the block diagram showing 1 operation form of this invention. In drawing 1, each text into which an utterance sentence is inputted into as text data, and is inputted one by one is called one utterance object, respectively. This utterance object is given to the utterance sentence processing module 1 and the subject structural module 2. Including the syntax-analysis module 11 and the keyword weight calculation module 12, the syntax-analysis module 11 carries out morphological analysis of the inputted utterance object, and the utterance sentence processing module 1 extracts a keyword group. This keyword group is given to the keyword weight calculation module 12 while it is given to the subject structural module 2. The keyword weight calculation module 12 calculates the weight of each keyword, and gives it to the subject structural module 2.

[0014] Reflecting the relation of the keyword object and utterance object which were obtained by the point in time, the subject structural module 2 arranges these on two-dimensional space, and structures the contents of a dialog. The two-dimensional spacial configuration information on an utterance object / keyword object is given to the subject expansion situation-recognition module 3. In the subject expansion situation-recognition module 3, including the main subject detection module 31 and the subject blank field detection module 32, the main subject detection module 31 detects the position of main subjects, and the subject blank field detection module 32 detects a subject blank position.

[0015] Drawing 2 is a flow chart for explaining operation of the subject structural module 2 and the subject expansion situation-recognition module 3 which were shown in drawing 1.

[0016] Next, with reference to drawing 1 and drawing 2, concrete operation of 1 operation form of this invention is explained. The syntax-analysis module 11 of the utterance sentence processing module 1 analyzes the syntax of the inputted utterance object, and determines the part of speech of each word. Subsequently, only the word which has not determined a noun and a part of speech is taken out, and let this word group be the keyword of the utterance object. And the keyword weight calculation module 12 is the keyword w_i in the n -th utterance object. It asks for weight W_{wi} and n by the following formula.

[0017]

[Equation 1]

$$W_{wi,n} = \frac{\left(1 + \frac{1}{1 + e^{-f_{wi,n} + F_1}}\right) \left(1 + \frac{1}{1 + e^{-i_{wi,n} + I}}\right)}{\left(1 + \frac{1}{1 + e^{-f_{wi} + F_g}}\right)^2}$$

[0018] however, f_{wi} -- the -- up to a $n-1$ utterance object -- w_i or it appeared in how many utterance objects -- f_{wi} and n -- the n -th utterance object -- w_i how many it appeared, and i_{wi} and n -- w_i It is shown whether it was used before how many shot word of the n -th utterance object recently. Moreover, F_g , F_1 , and I are constants and give the value of 5, 1, and 10 experientially, respectively.

[0019] The reason made into such weighting is in the following point. First, the keyword with the high

frequency of occurrence is a word generally used in any dialogs, or is either of the words in connection with the overall subject of the dialog, and its significance in the structuralization of subject is low anyway. If such a word has big weight, in the structuring stage of the subject described later, each subject cluster may be made not clear.

[0020] It is based on the idea that its significance is high when being used, after it is not used for a while, even if the word which appear during 1 utterance was a high frequency word with a high significance in the utterance.

[0021] Next, in the step (in illustration, it is called SP for short) SP 1 shown in drawing 2, the subject structural module 2 will find the distance between each object based on a duality scale method using the coincidence relation in the utterance object of each keyword object, if it says to the share relation of the keyword object of each utterance object, and reverse. Here, a duality scale method is the technique of expressing the attribute share nature of objects, and the coincidence nature of attributes as relative physical relationship in space by giving the amount of points to an object set and an attribute set, respectively, when the object set which consisted of two or more quantification attributes is given. In a step SP 2, two high orders with the high degree of contribution are taken out among the principal components which quantify space structure, and the positional information on the two-dimensional space of each object is determined.

[0022] The main subject detection module 31 of the subject expansion situation-recognition module 3 divides two-dimensional space into the cell of 16x16 in a step SP 3. And it asks for the average of the number of the utterance object contained in the cell itself and eight cells around it about the n-th cell in a step SP 4, and let this be the weight of the n-th cell. This is calculated about all the cells of 16x16. The cell in which weight exceeds predetermined threshold θ in a step SP 5 is chosen, it considers that this is a main subject cell, and the coordinate of the center of those cells is outputted.

[0023] On the other hand, when the subject blank field detection module 32 applies the Euclid distance transform technique etc. about the field where the cell of zero exists [weight] in a step SP 6, it asks for the center position and the weight of a center of the field (the distance from the cell field which is not weight zero, and far from weight become large). The Euclid distance transform technique is the technique of finding the distance from the circumference of the field center and center on space. Consequently, weight chooses the blank field center exceeding predetermined threshold ϕ , considers that this is a subject blank center, and outputs the coordinate based on [those] fields.

[0024] Like ***, the position and subject blank position of main subjects are detectable with this operation form.

[0025] Drawing 3 is the block diagram showing other operation forms of this invention. In drawing 3, the utterance sentence processing module 1, the subject structural module 2, and the subject expansion situation-recognition module 3 are the same as that of drawing 1, and the subject offer module starting module (subject conversion detection module) 4 and the subject offer module 5 are further formed with the operation form of this invention. The subject offer module starting module 4 detects the subject commutation point, and it is the timing directed from the subject conversion detection module 4, and the subject offer module 5 extracts the information used as the kind of subject according to the situation, and it provides a user with it. For this reason, the subject offer module 5 contains keyword extraction and the weight calculation module 51, the report database reference module 52, and the associative remembrance module 53.

[0026] Drawing 4 is a flow chart for explaining operation of the subject offer module 5 shown in drawing 3. In addition, the utterance sentence processing module 1 and the subject structural module 2 in drawing 3, and the subject expansion situation-recognition module 3 perform the same operation as drawing 1, detect a main subject position and a subject blank position, and give them to the subject offer module 5. The subject offer module 5 distinguishes whether in a step SP 11, the starting instruction came from the subject offer module starting module 4, and if it stands by if a starting instruction does not come, and a starting instruction comes, it will distinguish whether in a step SP 12, the subject blank position was detected from the subject expansion situation-recognition module 3.

[0027] If there is a subject blank field, the subject blank field center near the utterance object inputted in

a step SP 13 recently will be looked for, and keyword extraction and the weight calculation module 51 will collect the keyword objects of m predetermined numbers sequentially from a near thing in a step SP 14 centering on a subject blank field. Simultaneously, it asks for the weight which is in inverse proportion to distance from a subject blank field center about each keyword object. And let the gained weighting keyword group be a reference keyword group in a step SP 15. In a step SP 16, report database reference which the report database reference module 52 has is performed using a reference keyword group, and a reference result is offered.

[0028] In the above-mentioned step SP 12, if there is no subject blank field, the main subject cell near the utterance object inputted in a step SP 17 recently will be looked for. And keyword extraction and the weight calculation module 51 collect the keyword objects of m predetermined numbers sequentially from a near thing in a step SP 18 focusing on a main subject cell. Simultaneously, it asks for the weight which is in inverse proportion to distance from a main subject cell center about each keyword object. In a step SP 19, using the weighting keyword group for which it asked, the associative remembrance module 53 performs associative remembrance, and obtains an associative keyword group according to the associative event which the system has beforehand. And in a step SP 16, using a reference keyword group, report database reference of the report database reference module 52 is performed, and a reference result is offered by making the gained associative keyword group into a reference keyword group in a step SP 20.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of 1 operation gestalt of this invention.

[Drawing 2] It is a flow chart for explaining operation of the subject structural module and subject expansion situation-recognition module which were shown in drawing 1 .

[Drawing 3] It is the block diagram showing other operation gestalten of this invention.

[Drawing 4] It is a flow chart for explaining operation of the subject offer module shown in drawing 3 .

[Description of Notations]

- 1 Utterance Sentence Processing Module
- 2 Subject Structural Module
- 3 Subject Expansion Situation-Recognition Module
- 4 Subject Offer Module Starting Module
- 5 Subject Offer Module
- 11 Syntax-Analysis Module
- 12 Keyword Weight Calculation Module
- 31 Main Subject Detection Module
- 32 Subject Blank Field Detection Module
- 51 Keyword Extraction and Weight Calculation Module
- 52 Report Database Reference Module
- 53 Associative Remembrance Module

[Translation done.]

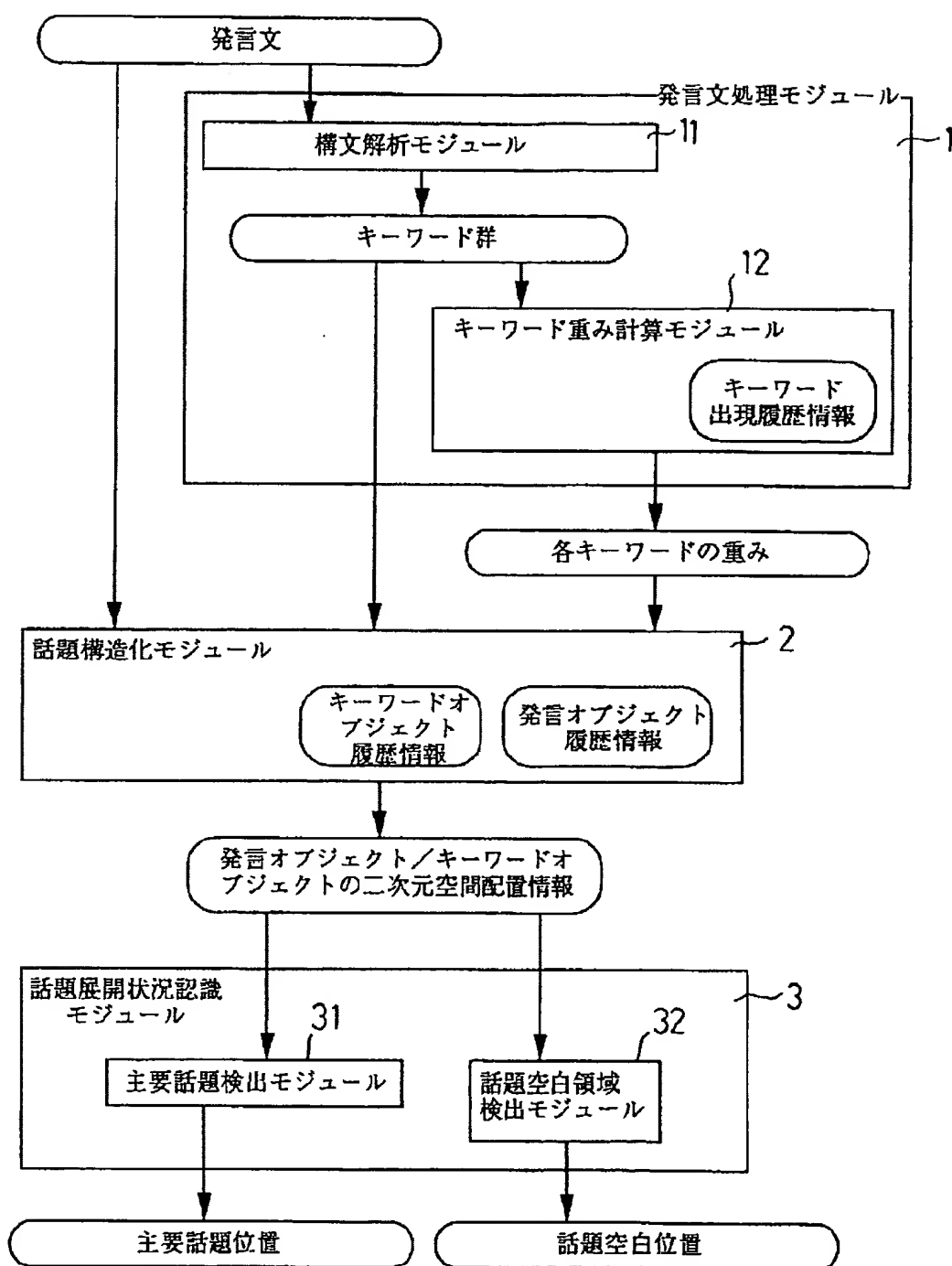
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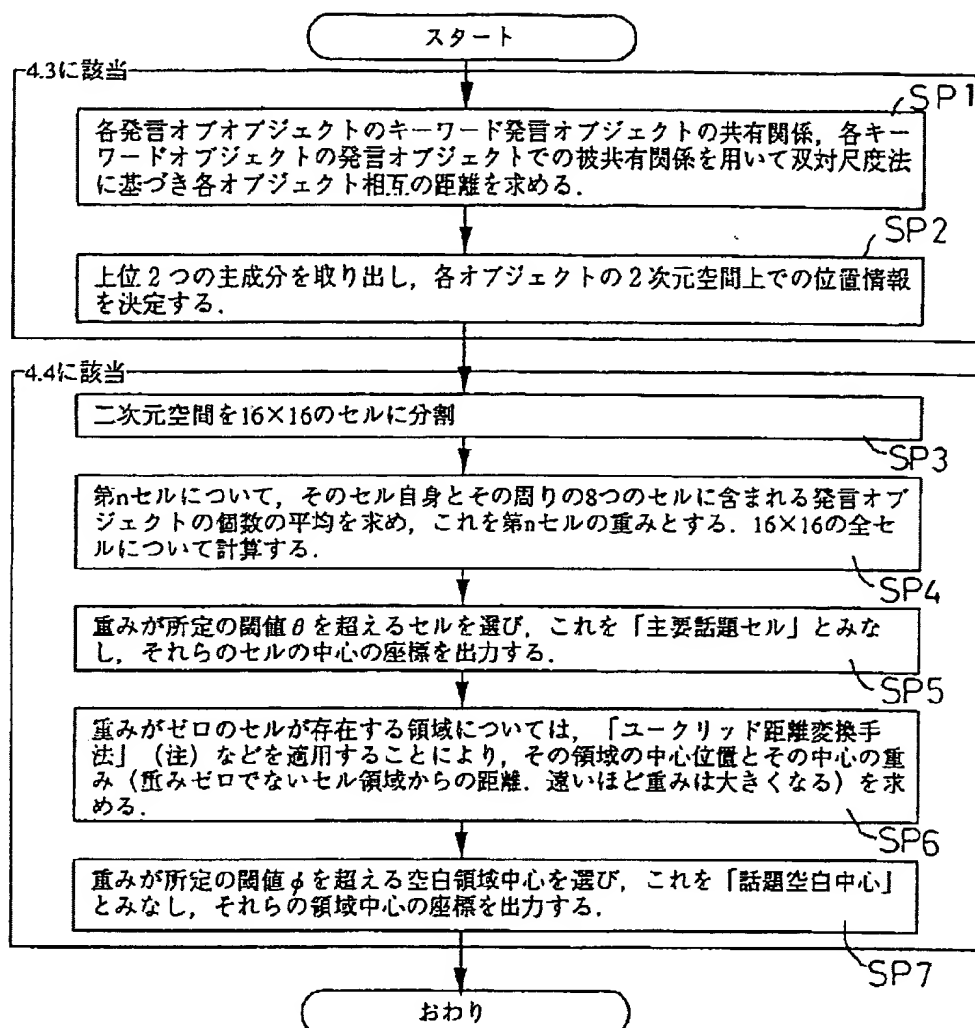
DRAWINGS

[Drawing 1]

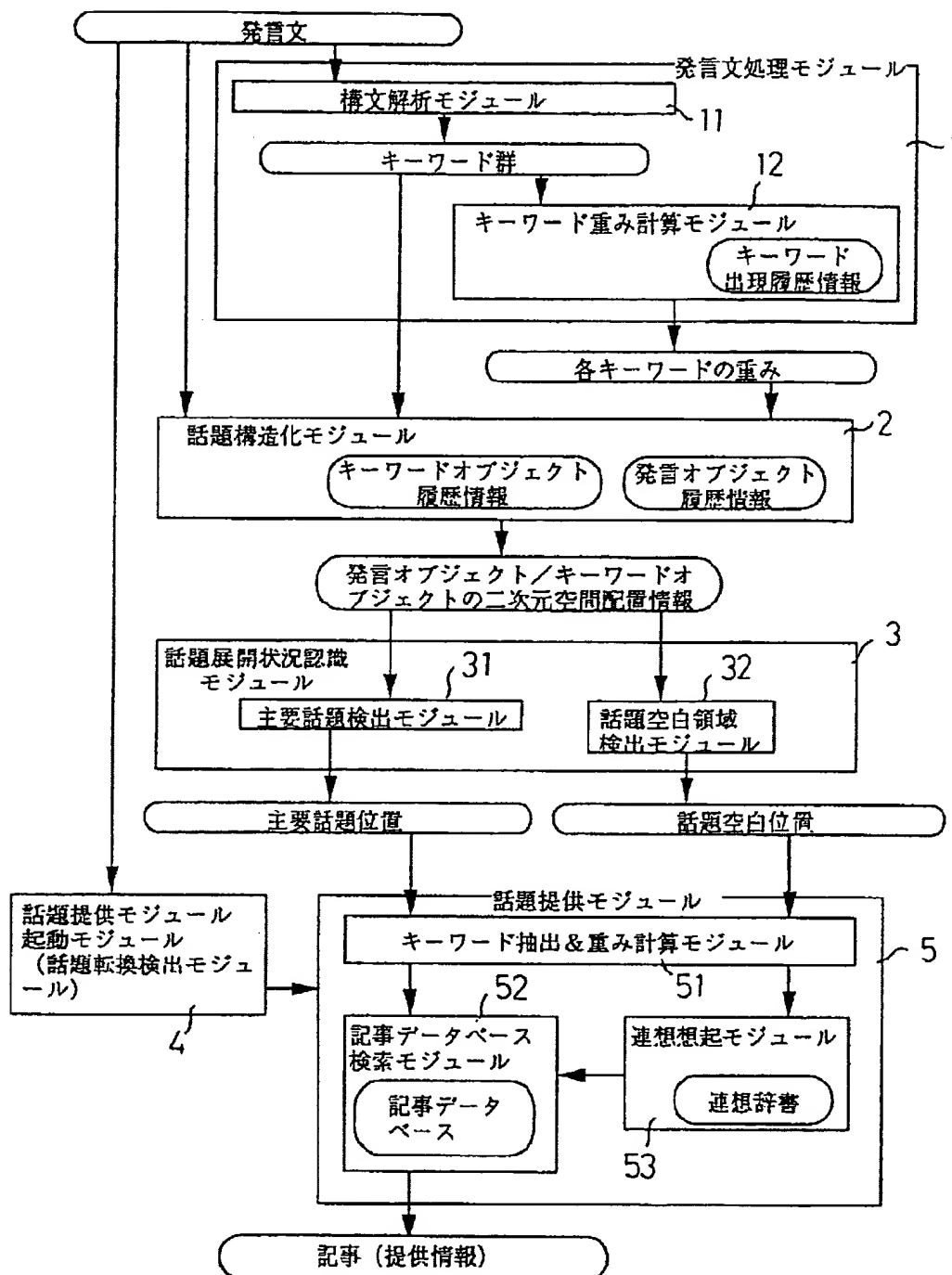


[Drawing 2]

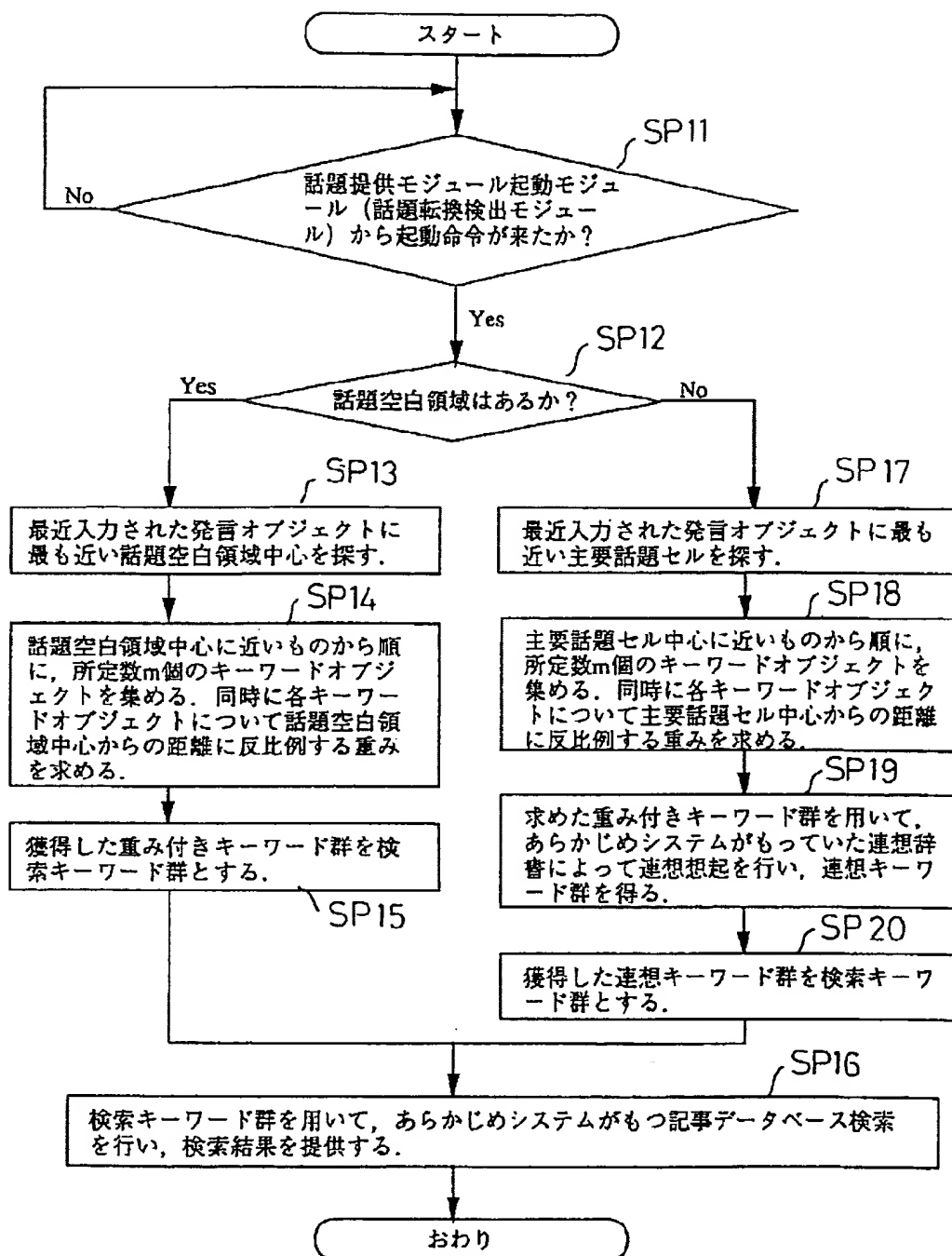
4.3と4.4のアルゴリズム (フローチャート)



[Drawing 3]



[Drawing 4]



[Translation done.]